

## CLAIMS

- 1) Wrapping machine for wrapping chocolates and similar products (100) with a wrapping material (101), including an unwinding and cutting group (6) and a feeding group (10) fit to feed a elevator group (5) respectively with a portion of wrapping material (101) and a respective product (100) which are provided associated from said elevator group (5) to a wrapping head (2) to mate a folding group (3) and to be transferred to an outlet group (7) of the wrapped product (100); said machine (1) being characterized in that:
  - the wrapping head (2) has radially and angularly equidistant at least eight gripper means (4) for the product (100) associated to the wrapping material portion (101);
  - the folding group (3) includes a plurality of folding modules, at least first (31), second (32) and third (33), positioned around the wrapping head (2) and fit to fold the wrapping material portion (101) around the product (100);
  - the folding group (3) includes at least three seats first (45), second (46) and third (47) fixed around the wrapping head (2) for housing alternatively and removably at least one of the folding modules (31, 32, 33);

one or more folding modules (31, 32, 33) being independently operated to carry out different wrapping styles of the wrapping material (101); by positioning at least a folding module (31, 32, 33), fit to be connected to one of the seats (45, 46, 47), it can be set a predefined transfer orientation of said wrapped product (100) towards the outlet group (7).
- 2) Machine according to claim 1 characterized in that the first folding module (31) includes first folder means (40) mobile along a direction tangential with respect to the wrapping head (2) and fit for folding a lower border of the wrapping material portion (101) with double twist wrapping style.
- 3) Machine according to claim 1 characterized in that the first folding module (31) includes two seconds folder means (41) facing each other and oscillating along direction tangential with respect to the wrapping head (2), fit for folding side borders of the wrapping material portion (101) with envelope portfolio wrapping style.
- 4) Machine according to claim 1 characterized in that the second folding module (32) includes folder means third (42) and forth (43) mobile and fit for carrying out orthogonal and opposed folds of borders of the wrapping material portion (101) with envelope portfolio or fancy or bunch wrapping style.

- 5) Machine according to claim 1 characterized in that the third folding module (33) includes a couple of closing fingers (44) for closing the wrapping material (101) according to a double twist wrapper style.
- 5 6) Machine according to claim 1 characterized in that includes first fixed folder means (80) interposed at least between the elevator group (5) and the wrapping head (2) for folding borders of the wrapping material (101) while the elevator group (5) moves the product (100).
- 10 7) Machine according to claim 1 characterized in that includes second fixed folder means (81) positioned around the wrapping head (2) for folding borders of wrapping material (101) when the wrapping head (2) moves the respective product (100).
- 15 8) Machine according to claim 1 characterized in that the first seat (45) is approximately adjacent to the third folding module (32); the second seat (46) is in a position nearly symmetrical to the first seat (45) with respect to vertical plan passing through the rotation axis of wrapping head (2); the third seat (47) is interposed between the seats first (45) and second (46) and approximately aligned to the vertical plan passing through the rotation axis of wrapping head (2).
- 20 9) Machine according to claim 1 characterized in that the third folding station (33) is connected to the first seat (45) and the outlet group (7) of product includes removal means (35), fit to pick each product (100) wrapped by the wrapping head (2) and to transfer it to transport means (36) for orderly moving outwards the products (100), according to a
- 25 moving direction parallel to the moving direction of the wrapping material (101) in the unwinding and cutting group (6).
- 10) Machine according to claim 9 characterized in that the transport means (36) extend starting from the removal means (35) in concordant or opposite direction with respect to the entry
- 30 direction of products (100) in the feeding group (10).
- 11) Machine according to claim 1 characterized in that the third folding station (33) is connected to the second seat (46) or to the third seat (47) and the outlet group (7) includes chute means (38) for the bulk exit of products (100).

12) Machine according to claim 1 characterized in that the feeding group (10) of product (100) includes:

- a first belt means (13), having continuous advance motion, which supports and moves a plurality of products (100), aligned and arranged in a single line at mutual contact;
- a second belt means (14) aligned and downstream the first belt means (13), having an alternate advance motion and associated to holding means (15) of the product (100);
- a positioning wheel (9) rotating, facing the second belt means (14) downstream the holding means (15) and having angularly equidistant a plurality of pliers means (11) for gripping the product (100);

the second belt means (14) moves the products (100), reciprocally spaced, from a picking condition (A), in which the second belt means (14) receives the product (100) from the first belt means (13), through moving conditions (M), in which the holding means (15) keep each product (100) fixed to the second belt means (14), to a transfer condition (T), in which the second belt means (14) is motionless and the product (100), not constrained thereto anymore, is grasped by a pliers (11) of the positioning wheel (9), which moves the product (100) with circular motion, from the transfer condition (T) to a release condition (R) in which the wheel (9) is motionless and pliers (11) is opened for transferring the product (100) to the elevator group (5).

13) Machine according to claim 12 characterized in that includes a third belt means (16) aligned to the first belt means (13) and positioned upstream thereto having a continuous advance motion.

14) Machine according to claim 13 characterized in that the first belt means (13) has translation speed lower than the speed of third belt means (16) and greater than the average translation speed of second belt means (14).

15) Machine according to claim 12 characterized in that the holding means (15) includes at least an air suction means (17) connected through duct means (19) to at least an opening (18) of second belt means (14), in order to hold by suction each product (100) supported by the second belt means (14).

16) Machine according to claim 15 characterized in that the suction means (17) consists in a vacuum pump or a suction fan.

- 17) Machine according to claim 15 characterized in that the opening (18) includes a plurality of through holes carried out on the second belt means (14).
- 18) Machine according to claim 15 characterized in that the second belt means (14) consists of a couple of conveyor belts (22) parallel and transversally spaced apart by a longitudinal slot which realizes an opening (18) at least.
- 19) Machine according to claim 15 characterized in that the duct means (19) include a suction mouth (23) having an elongated shape and in flow communication with the opening (18).
- 20) Machine according to claim 19 characterized in that the duct means (19) include at least a inner duct having divergent shape starting from the suction mouth (23) up to connection with the suction means (17).
- 21) Machine according to claim 12 characterized in that the feeding group (10) includes at least sensor means first (20) and second (25), optical or inductive or capacitive type, fit for sensing the presence of products (100) respectively in correspondence of the first belt means (13) and of the second belt means (14).
- 22) Machine according to claim 12 characterized in that the second belt means (14) is rotatably powered by an electric motor (21) of brushless type, controlled in position, speed and acceleration.
- 23) Machine according to claim 12 and 13 characterized in that that the belt means, first (13) and third (16), are rotatably powered by at least a respective ratio-motor (24).
- 24) Machine according to claim 12 characterized in that the positioning wheel (9) includes at least four pliers means (11) mutually positioned at 90° and fixed to the wheel (9) with an arrangement almost tangential to a circumference inscribed in the positioning wheel (9).
- 25) Machine according to claim 12 characterized in that the positioning wheel (9) includes a first column (61) fixed to the machine (1) and rotatably supporting a second column (62) and a third column (63), coaxial thereto and independently rotating on a vertical axis.
- 26) Machine according to claims 24 and 25 characterized in that each pliers means (11) is fixed,

through a support plate (68), to the third column (63) and includes a couple of mobile tines (12), symmetrically rotating between a closing condition (C), in which said tines (12) are at the minimum mutual distance for gripping a product (100), to an opening condition (D), in which they are at the maximum mutual distance for releasing said product (100).

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27) Machine according to claim 26 characterized in that each pliers means (11) includes transmission means (65) connected to control means (64) of the second column (62), these last ones being fit to open and close the mobile tines (12) of each pliers means (11), through the rotation of said second column (62).

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28) Machine according to claim 26 characterized in that each transmission means (65) includes at least a pivot (67), slidably supported by third column (63), connected to the mobile tines (12) of the respective pliers means (11) through a pinion-rack connection, and slidably engaged by sliding rolls (66) to a cam profile of control means (64).

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29) Machine according to claim 1 characterized in that the elevator group (5) includes articulated quadrilaterals (51, 52) connected to respective powered cams and fit for moving at least a counter-elevator means (50) and an elevator means (53).

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30) Machine according to claim 29 characterized in that the elevator means (53) includes at least two side rests (59) for supporting the wrapping material portion (101) during the raising of product (100).

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31) Machine according to claim 1 characterized in that the feeding group (10) of the product (100) includes:

- a storage belt (71), having an alternate advance motion, for moving aligned products (100);
- pusher means (72) for transferring each product (100) from the belt (71) to a feeding disk (73), having a plurality of first slots (74) for housing products (100) and rotating on a vertical axis for transporting these last ones to the elevator group (5).

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32) Machine according to claim 1 characterized in that the feeding group (10) includes a storage hopper (75) of product (100) which feeds a centrifugal filling disk (76), having a plurality of second slots (60) and rotating on a vertical axis for transporting each product (100) to the elevator group (5).

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33) Machine according to claim 1 characterized in that the feeding group (10) includes a belt (77) provided with counter-dies (78) for accommodating respective products (100) and for transferring said products to the elevator group (5).

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34) Machine according to claims 31 and 32 characterized in that the feeding group (10) is of combined type and includes at least a storage belt (71) with pusher means (72) and a feeding disk (73), and a hopper (75) with centrifugal filling disk (76).

10 35) Machine according to any of the preceding claims characterized in that is totally controlled by electronic calculation and control means fit to control the phase relations at least among the feeding group (10), the elevator group (5), the unwinding and cutting group (6), the wrapping head (2), the folding group (3) and the outlet group (7).